18. *Cryopreservation Under High Hydrostatic Pressure.* MAXIM D. PERSIDSKY (The Institute of Medical Sciences, Pacific Medical Center, Clay and Webster Streets, San Francisco, California 94115).

Use of high hydrostatic pressure for controlling phase transition in water may offer new opportunity for improving cryopreservation procedures. Further development by this author of the theoretical background on the thermodynamic events in water during phase transition revealed, among other facts, that: (1) ice I may be formed at pressures up to 40,000 psi and temperatures below −26°C; (2) above 31,000 psi ice I is unstable and is transformed into ice III; (3) ice III can be induced either by rapid pressure reduction or by rapid pressure increase; and (4) a new transient form of high pressure ice may exist.

Based on this new information it was possible to formulate key experimental conditions necessary for exploration of cryobiological potentials of the use of high pressure. These conditions are: (1) spontaneous freezing under high pressure; (2) induced freezing by one step-pressure reduction; (3) induced freezing by multiple step-pressure reduction; (4) induced freezing by pulsating multiple step-pressure reduction; and (5) induction of ice III by rapid pressure increase.

Results of EM examination of heart valve tissue following treatment under each of these conditions revealed that freezing induced by one step-pressure reduction yielded viable cells, as judged by their morphology. This and other results will be presented. (Supported by National Institutes of Health Grant 5 R01 HE12668-02.)